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BROADENING THE FIELD OF NUTRITION FOR NATIONAL HEALTH

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This organization meeting of the Japanese Society of Food and Nutrition

is to me a significant occasion. You have opened your membership to individuals trained not only in the basic science of nutrition but to others professionally interested in food as it relates to public health, agriculture, commerce, transportation and education. You are creating a forum where the leaders in all these fields can share their ideas, coordinate their programs and plan for cooperative work for their common objectives. I believe that such an integrated approach is necessary for the solution of your problems, and I congratulate you upon undertaking it.

I also wish to acknowledge the notable contributions which Japanese scientists have made in the past to the science of nutrition. I am familiar with the programs you have developed for the improvement of the nutritional status of your people. Before the war ^{Dr. T. SAIKI} you had ably presented some of your problems to the League of Nations. You now have a considerable body of trained nutritionists who are engaged in research, in teaching and in showing people how to improve their dietaries.

I have sat with some of the committees which are considering the nutritional problems of Japan during the reconstruction and I am impressed by their insight and ability - I am also impressed by the fact that many of the practical problems you face here are the same that occurred in the other countries where I have worked that have had to live on restricted food supplies - as Japan is now doing.

The development of a nutrition program to improve the health of the Japanese people is the concern of this new society. I have chosen to discuss

today the three phases of such a program which seem to me most important.

As I see it, if you are to broaden the field of nutrition and make your most effective professional contribution to your country your members should:

(1) Extend further the body of scientific and technical knowledge of feed and nutrition; (2) Apply the technical knowledge we now have to the improvement of the everyday diet of the people; (3) Convince people that good nutrition is important and educate them to make the best use of the feed available.

To accomplish these objectives you will have to change some established practices in the fields of public health, agriculture, marketing and education. And to do that you must have understanding, support and cooperation between the leaders in these fields. So again I emphasize the importance of the broad membership of this society.

Let us now consider briefly some phases of the work which needs to be done in the areas I have suggested.

1. Extension of Technical Knowledge of Nutrition.

The search for further knowledge of nutrition, the function of feed in the body and the sources of nutrients must continue. In other words, you must stimulate research. Research depends primarily upon workers with sound training, ideas and the opportunity to develop them. Most discoveries result from the recognition of deviations or unusual conditions that occur in the course of controlled experiments planned to test some theory or hypothesis. The alert mind realizes the importance of the deviation noted and follows the clue. It is important to develop individuals with imagination and to give them the opportunity to work.

The war intercepted the interchange of scientific information between nations. Since the trend of research during wartime is toward the application of new discoveries to the practical problems of armies, and theories are tested and knowledge examined in the light of immediate needs, considerable progress ^{OUR KNOWLEDGE OF PRACTICAL} has been made in the ~~field~~ of nutrition. It is important that you review the work published in other countries before you undertake new research. The work that has been done in Japan should also be made available to other countries.

Research in nutrition at present is characterized by study of the physiological requirements of man and animals, the action of pure nutrients, the combined effect or interaction of nutrients, and the pathological effects of nutritional deficiencies. This work has been made possible by the recent isolation, identification, purification and synthesis of some of the vitamins and by improved techniques and methods of study. The relationship between the effects of nutrients in man and ^{IN} various species of animals needs to be established in order to determine the extent to which the results of work with animals is applicable to man. While the number of nutrients known to be required for growth and health has been increased and their functions ^{CLARIFIED} studied in the last 30 years, there is still much to be done in this field.

There is also need to review some of the older work on protein, fat and carbohydrate requirements. This is necessary because ~~in the early work~~ many of ^{THE} our conclusions ^{DRAWN} were based on mixtures which were not pure nutrients, but contained vitamins and minerals. ~~There have been definite advances~~ ^{have been made} in our knowledge of fat metabolism and the need for fats. The latter should be dissociated from a consideration of palatability. ~~Fats must also be considered from the point of view of~~ Essential fat acids and the relation ^{NEED FURTHER STUDY} of fats to the absorption of fat soluble vitamins. In Belgium, for example,

the vitamin A and carotene content of the plasma was found to be normal in children on a very low fat intake.

The study of the field of digestion and absorption of nutrients from feeds is important, as is that of the availability of nutrients from bacterial activity in the intestinal tract and the effect of interfering substances on the availability and use of nutrients. We know the general effect of indigestible material on the availability of nutrients. It would be well to determine the losses of nutrients that occur in individual feeds as well as in a typical Japanese dietary in order to consider the advantages of a more complete dietary from unrefined feeds at the expense of small losses of energy. The question is tied up so closely with feed habits and preferences that sound recommendations can only be determined by unbiased investigations.

There is a question as to the effect of phytic acid on calcium absorption. There is some evidence that while calcium phytate is not readily absorbed in short term experiments, there is little serious interference with calcium absorption over longer periods. In England there was great opposition to the use of 85% extraction flour for this reason, and evidence was produced on both sides of the question. The best controlled evidence pointed to a distinct advantage in the use of the higher extraction flours.

One of the most important practical advances in nutrition in the U.S. was the tentative establishment of nutritional requirement for calories and protein as well as for some of the vitamins ^{AND MINERALS}. The Japanese National Food and Nutrition Council is now working on such requirements for Japan. In the United States these requirements are called "nutritional allowances". ^{THESE} Such tentative allowances were set at levels that were believed to be necessary for abundant health, that would maintain people of different ages, sex and

activity without evidence of nutritional deficiency and would permit development and activity consistent with the inheritance of the individual. There is not complete agreement as to some of the quantities set. There is also ^{SUR} ~~a~~ ^{THE} need for determining ~~of~~ levels below which health and efficiency are seriously impaired. Such determinations must show the extent to which body activity or efficiency is maintained or impaired. They must also show in cases of impairment whether or not permanent injury occurs if the levels are continued for long period or whether the effects are temporary.

Means for detecting nutritional deficiencies and impairment of efficiency must be developed for use in clinics and in public health studies. Both physical signs and biochemical or physical tests are important. We have considerable material for detecting frank deficiencies, but the signs, symptoms and laboratory evaluations of border-line cases are not well established. Detection of such cases is especially important in preventive medicine and public health.

Studies of the effects of moderate deficiencies require long periods of experimentation, hence we will need to depend largely upon studies with animals and even generations of animals supplemented by observations of people whenever possible.

The value of established nutritional allowances, even though tentative, ^{ENABLE YOU TO THINK IN TERMS OF NUTRIENTS INSTEAD OF PARTICULAR FOODS} is that they free one from the restraint of particular feed patterns. By using them the adequacy of a dietary can be determined which differs from the usual one in the kind or amount of feed consumed. The soundness of desirable or necessary modifications in dietaries can be judged on the basis of the nutrients contained in them rather than on the presence or absence of specific feeds. [#] Investigators have fed animals fairly successfully on

synthetic or purified diets. With man, however, it is still desirable to depend upon the natural feeds to supply the nutrients or combinations of nutrients which are not covered by the allowances. The use of synthetic vitamins and purified feeds is undesirable except in the treatment of specific conditions.

SCIENTIFIC

2. Practical Application of Research.

So much for research itself. Next we may consider its application.

The nutritionist must play an active and positive role in the translation of scientific findings into terms that are readily understood by anyone. He must relate his tables of feed composition and his dietary allowances to the feed habits of the people and the feeds actually available in the market. He may use as the background for his advice such information as:

- (a) Established nutritional allowances such as we have just discussed.
- (b) The classification of feeds into groups based on their similar nutritive values or because they have unique characteristics.
- (c) Data on the composition of feeds as actually eaten.
- (d) Well worked out plans for correcting nutritional deficiencies through the use of customary feeds and the feed habits insofar as possible.

The classification of feeds into groups of approximately the same composition, or because of unique characteristics is particularly valuable in teaching nutrition and in evaluating dietaries. There are many combinations of feeds that will provide an adequate dietary. Actually we tend to follow rather restricted feed patterns. However, many deviations occur due to variations in the feeds available, to individual feed habits and to opportunity to purchase feeds that are peculiar but adequate. By putting

similar feeds into ^{one} a group it is possible to discuss feed requirements without becoming involved in a discussion of the composition of a multiplicity of individual feeds and to cover the many varieties of feed that occur in different parts of the country or in different seasons of the year.

The classification of feeds which has been used in the nutritional surveys in Japan is quite satisfactory though modifications may prove desirable in the future. It is as follows:

- (a) Grains and their products: Rice, Wheat, Barley and Other Grains). In Japan it may be desirable to subdivide rice into polished and semi-polished and unpolished rice, because of the low nutritive value of polished rice. If wheat should ever be used in considerable amounts as white flour of low extraction it might be necessary to subdivide wheat and its products into white flour and other wheat products.
- (b) Roots and Tubers
- (c) Potatoes: Sweet potatoes, White potatoes and Other Roots and Tubers.
- (d) Legumes, dried: Soy beans, Soy bean products. Other beans. It is desirable to differentiate between soy beans and soy bean products because of ^{the} considerable use of soy bean products with a high water content and the loss of nutritive value in the preparation of such products. In evaluating diets on the basis of the quantities of legumes consumed it is desirable to reduce the soy products to the approximate quantity of dried beans they represent. Miso is roughly one-third dried beans. When tofu becomes generally available again it may be necessary to use a different factor or subdivide the products.
- (e) Oils and Fats. When butter or margarine containing vitamin A is used in considerable amounts it would be desirable to subdivide this class into "butter and margarine" and "other fats".

(f) Animal Products: Fish and Shell fish, Meat of all kinds, Eggs and Milk. If milk or milk products (except butter) was generally available it should be in a separate class. Special attention should be given to milk for children. It would be desirable to subdivide fish, as the Tokyo Pharmaceutical Association did, into "fish eaten with bones" and "all other Fish" because of the calcium in the former.

(g) Leafy, green and yellow vegetables. This class is the most important of all vegetables and fruits because it is a source of carotene, the precursor of vitamin A. The green leaves are also a source of protein, iron and the vitamin B complex and other nutrients about which we are not fully informed. As in animal feeding they are considered an overall corrective of the dietary at least until we have more information.

(h) Tomatoes and Citrus Fruit: This classification is justified because these foods are important sources of vitamin C. They have a hydrogen ion concentration, high acidity, in which vitamin C is relatively stable.

(i) Other Fruits and Vegetables.

(j) Seaweeds

(k) Dried and Pickled Vegetables. It is necessary to separate these processed vegetables in Japan and some other countries because of the loss of vitamin C and other water soluble vitamins in their preparation and the quantities that are used at some times of year. It is true that when vegetables are pickled with rice bran or polish they may make an important contribution to the vitamin B requirement.

In classifying vegetables, fresh green beans and peas belong with the green vegetables. Canned vegetables are grouped with the fresh vegetables because when properly canned they are as good sources of vitamin C or carotene as the average market vegetables.

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1. Flavours. An approximation of the nutritive value of a dietary may be determined from the quantities of the various classes of food consumed. When the foods are of the same general food pattern differences in quantities of one or two classes are often significant. The Nutrition Section of the Ministry of Health and Welfare has worked out weighted averages of the composition of the various classes of food in relation to the total production in Japan of the major foods in each class. Calcium, iron and the different vitamins are included. The use of such values gives a picture of the average intake of nutrients over the period of a year rather than the amount of any particular food eaten at the given time. This is based, of course, on the assumption that the consumption of foods continues at about the same rate for each group of foods.

^{IN USING NUTRITIONAL ALLOWANCES}
One must keep in mind that "nutritional allowances" ^{They} refer to the quantities of nutrients required by the body, ^{And} they are based upon the composition of a food as actually eaten. ~~In determining the nutritive value of foods~~
^{IN USING} ~~as eaten from~~ the usual tables of food consumption, it is necessary to allow for changes in composition from the time the food is produced until it is consumed. ^{Such} changes occur particularly in the vitamins although they may occur in any water soluble or unstable nutrients. ^{For example} We all know that losses of nutrients occur in polishing rice as well as in washing and in cooking it, and that there is a decrease in vitamin C ^{IN VEG-TABLES} in storage. I have also noted some work in Japan on the losses of vitamin C in cooking rice, and there is undoubtedly other work.

^{VALUABLE} Considerable work has been done on losses in preparation, storage and serving of food in the United States and in Great Britain. These studies have related particularly to vitamin A or carotene, B, B₂, C and niacin.

and some work on protein. ^{Since} The cooking and handling of feed are not standardized processes, ^{It} is well to obtain information on percentage losses of nutrients that result at various stages in the worst, average and best methods of cooking or handling. ^{Food} Such data are useful in teaching good methods of feed preparation as well as in evaluating dietaries.

Large losses in vitamin content of cooked feed may occur, especially in the oxidizable vitamins, during the period it is allowed to stand before serving.

The overall changes in nutritive value of feed during preparation and ^{IN} serving ~~the~~ the United States have been estimated to be:

Losses in Cooking, USA Dietaries - Total Feed

Thiamine	40%
Riboflavin	15%
Niacin	20%
Ascorbic Acid	35%

Another basis for determining overall nutritional deficiencies is the study of the feed patterns of various parts of the country and of special groups of people within a given area. With this information it is possible to concentrate on the means of correcting the major deficiencies. If such corrections are to be effective they must take into consideration the feed habits as well as the money resources of the people.

Recent nutrition surveys in Japan show that calcium and riboflavin deficiencies are major problems throughout the year. Thiamine (vitamin B₁) is a regional problem related to the polishing of rice and is seasonal in areas on the borderline of adequacy. It is probable that adequate vitamin C

and A are seasonal problems, affected in part by methods of preserving and preparing food. Inadequate protein is in part a regional problem. These remarks relate to the overall situation in Japan. Of course, many individual families have dietaries which are better or poorer than the average.

There are many possible solutions to some of these problems. But any solution should be based as far as possible on the food habits and resources of most families, both rich ^{AND} poor, farmer and city dweller.

England is a good example of what can be done by a government to improve the diet of a nation. During the war the only flour on the market ^{THERE} was 85% extraction, light brown in color, with calcium carbonate added. Milk and orange juice were reserved for the use of children and pregnant and lactating women. If these people could not afford them, the feeds were supplied without cost. In the United States, white flour was enriched with thiamine, niacin, iron and riboflavin in quantities characteristic of an 85% extraction flour. This practice is still required by law in a number of states. Bread too was required to have certain concentrations of these vitamins and iron.

In Japan you have officially recognized the nutritional deficiency of polished rice by requiring that rice shall be 94% extraction or 70% polished. In spite of this some of your people still eat white rice, because considerable rice is polished in the many small mills and on the farms.

There is no serious objection to the use of polished rice provided the other feeds in the dietary provide the nutrients removed in polishing. In most rice-eating countries the supplementary feeds available do not correct the deficiency. For good nutrition it is necessary to do away with highly polished rice or to correct the deficiency which results.

There are numerous possibilities for doing this. In India rice is parboiled, a method now being studied in the United States. It is not possible effectively to fortify rice directly. A procedure has been developed for fortifying part of the rice and then coating it to prevent loss in washing. The specially treated rice is then mixed with the polished rice. Trial plants using this method have been set up in China and the Philippines by Dr. R. R. Williams.

Yeast might be used to supplement poor dietaries. The possibilities of producing yeast cheaply from hydrolyzed saw dust is being studied in Hokkaido. But even with cheap yeast there is the problem of its incorporation, as such or hydrolyzed, in feeds that everyone eats. Yeast would contribute protein as well as the vitamin B complex. ^{FF} There are large quantities of rice polish available. It might be possible to develop a practice of extracting rice polish and using it in some commonly used feed. This might be especially effective in rural populations. Certainly the use of vitamins from rice polish or other feeds is better than using synthetic vitamin B₁.

Lack of riboflavin is another serious problem in Japan and more difficult to meet than lack of thiamine. Riboflavin can be obtained from moulds at a low cost but there is the problem of persuading the average person to use it. An ideal solution would be to modify some of the home and manufacturing methods for preparing or processing some universally used feeds such as miso or soybeans ^{Soy} and to add organisms that produce sufficient riboflavin to supplement the ordinary diets.

Calcium deficiency is a problem for everyone but especially serious for children and pregnant and lactating women. Milk is an excellent source of both calcium and riboflavin but milk production in Japan is insufficient

to supply everyone's needs. Even the increased production possible will be insufficient for many years to come. It is important to remember that skimmed milk is practically as good as whole milk as a source of calcium and riboflavin. Green leaves and fish with bones are also important sources of calcium. Increased use of fish meal or fish paste containing bones is desirable. The preservation of green leaves for winter use is a possibility. It would be well to consider the use of calcium salts in the preparation and processing of feeds, and the addition of calcium carbonate or phosphate as such to feed.

One problem of practical nutrition deserves your particular attention. A large part of the world lives on a basic dietary of grain products and leafy vegetables. It would be profitable to study intensively a reasonable range of combinations of these two classes of feed with the contribution each makes to the total requirement. If inhibitors are present, they too should be studied. A next step would be a study of the effect of the addition of the most promising supplementary feeds, one at a time and in known combinations. Out of such a study a planned program for improvement of the dietaries could be developed.

When planning better dietaries for special areas or conditions it is important to have data on the feed habits and normal consumption of the population as well as the kinds and amounts of the major feeds produced and available to them. The latter information is usually available from the agricultural experiment stations. Nutrition surveys will also be necessary to determine the feed habits and obtain consumption data. You have obtained some rather good information in Japan in the past. The surveys conducted currently by the Imperial Japanese Government are a source of data of great

value. They will be especially useful because they cover such a wide area.

These nutritional surveys are now made every three months primarily to appraise the food situation. Their success is due to a number of factors - you had already developed procedures for nutrition surveys in Japan; the people who were chosen to be surveyed have cooperated faithfully; the governors of the cities and prefectures and their assistants, especially those in the Sanitary Bureaus have given their active support; and the physicians and nutritionists who made the observations and assembled the results have worked competently and painstakingly. All these people have made important contributions to their country. I would like at this time to express my special appreciation of the skill and integrity of Dr. T. Cise who was originally directly responsible for the planning and conduct of the surveys for the Ministry of Health and that of Dr. Kuwabara of Tokyo who conducted the surveys in Tokyo where the largest number of persons was examined.

The results of the surveys have been of great importance in providing the facts on which to base food imports for Japan. The data from the surveys are also a sound contribution to the solution of world food problems. Through them Japan has demonstrated the value of actual knowledge of the nutritional status of the people and the food they are consuming. These Japanese surveys are unique in that they cover both the urban and rural areas and therefore give a picture of the whole country. Gen. C. F. Sams of SCAP was particularly wise in his advice to include the rural areas, for they provided a valuable comparison between rural and urban ^{PEOPLE} areas.

I trust that your government will realize the continuing value of nutrition surveys as a means of establishing and reviewing the nutritional

needs of the people, appraising the nutrition programs that are developed and showing where help is needed. Future surveys need not cover the whole country, but should sample various regions or special groups of people from time to time. Thus you will have eventually a check on the whole country over a period of years. It would be well for nutritional surveys in the future to include biochemical and physical tests in addition to check of the clinical symptoms of nutritional deficiency, to which the present surveys were limited.

3. Education for Better Nutrition

And now we come to the third and perhaps most challenging responsibility of the nutritionist. We all know that improvement in the nutritional status of the people will not come about until the people themselves adopt the new practices which you as nutritionists advocate. You must make the man on the street; the woman in the home; the child in school; realize that even on a simple restricted diet they can improve their health and sense of well being if they choose wisely and handle the food they have properly.

To do this will require education in the broadest sense, and the combined constructive efforts of scientists, nutritionists, physicians, agriculturists and educators. It is a difficult problem to change the habits and preferences of people - particularly when it involves eating, one of the most deep seated of human reactions, associated with most of the habits and pleasures of daily life. Food habits are traditional, passed on from one generation to the next, firmly fixed before formal education is begun. Food likes and dislikes are developed through association and experience and are often founded on superstition, folklore and bias. ^{FOR EXAMPLE} Today press and radio advertising may

help to establish bad feed habits because the advertiser gives half-truths, over emphasizes the value of his product and fails to give the facts necessary to judge the place of his product in the daily diet.

In addition to changes in feed habits, improvement in nutrition may require changes in the methods of handling and preparing feed in manufacturing and marketing processes as ^{well as} in the home and in public eating places.

So re-education for improved nutrition should extend to the farmers who produce the feed, feed manufacturers, feed marketers, cooks and housewives; to teachers, news and radio experts who advise and write for the public, as well as to those whose only interest in feed is in eating it.

These people, too, are resistant to change in their established practices and beliefs - and for the same reasons. In addition some of them may have a special interest in promoting the use of certain feeds, or in perpetuating present demands, and may actively oppose your recommendations.

The nutritionist must not only know ^{he must} this fact in terms of nutrients and feeds but be able to express them in simple terms that everyone can understand. He must also stand ready to assemble and check the facts for presentation by other teachers or popular writers - especially those of the press and radio.

In such work it may be necessary to gain the confidence of these writers so that they will turn to you for help. Your help is important because lay persons often lack the perspective and technical background that enables them to understand the fine distinctions that are sometimes necessary. They are also likely in their enthusiasm to ^{distort} misrepresent facts and ^{or} overemphasize a particular feed or nutritional fact and thus, in fact, mislead the public.

They also often fail to give a sound basis on which to select feeds. I have found this to be the case in material that has come to me for review. The material may not be inaccurate but still be misleading.

Since there are many combinations of feed that meet the nutritional requirements of people it is usually wise to suggest ~~two or more~~ ^{THAN ONE} combinations of feeds which will correct a particular dietary. At least one plan should be within the means of poor people.

I find that a chart showing the percentage of various nutrients contributed by each class of feeds in a typical feed pattern is a very useful device in the discussion of diets. Such a tabulation emphasizes the rather large contribution ^{OF VARIOUS NUTRIENTS} made to the daily feed needs by the feeds commonly eaten in large amounts, such as rice, potatoes, bread and leafy green vegetables. Such feeds are the backbone of the daily dietary. To them are added the more interesting supplementary feeds. Such a chart also shows the actual quantities of feed necessary to complete a particular dietary pattern.

I am sure there is much that can be done to introduce and improve education in nutrition in elementary and higher schools. Examples in arithmetic may be based on feed requirements. Information about nutrients may be introduced into material in elementary texts without an obvious discussion of nutrition. The meaning of the words and the idea of measuring one's feed needs will register in the minds of the children. Later when feed and nutrition is purposely discussed the words will not be new and the student will grasp the new associations because they will be part of his past experience.

Medical science all over the world is taking a new interest in the part nutrition plays in disease and in the prevention of disease. There is much to be done in strengthening medical education and in the re-education of

practicing physicians. This re-education is, as I suggested recently, something that the Japanese Medical Association might well undertake. Medical Associations in other parts of the world are doing similar work. It is important because physicians are in daily contact with the people. Their sound advice and support of good nutrition is an important phase of preventive medicine and contributes to the improvement of the health of the nation.

In conclusion may I repeat, the Society of Food and Nutrition, with its membership open to representatives concerned with all phases of the science of nutrition, to agriculturists concerned with the production of feed with high nutritive value, to manufacturers concerned with the preservation and processing of feed, to home economists concerned with the preparation and use of feed in the home, to physicians concerned with the health of the people both curative and preventive and to educators interested in the dissemination of sound information augurs well for the welfare and health of the Japanese people. This combination of interests is most fortunate because as I have said before it is only through cooperation of all these concerned with feed that you can hope to attain the improved nutrition you all recognize as essential for health. I am gratified too in the formation of the National Food and Nutrition Council of which the Prime Minister is President. It is important that nutrition be given serious consideration at the governmental level. Councils of this kind were formed in many countries as the result of the interest in nutrition in the League of Nations. The recently formed Food and Agriculture Organization of the United Nations has specifically fostered such councils as a part of its planning for better nutrition throughout the world. Support is also assured for your National

